

Steam Gasification Characteristics of Biomass in a Thermobalance and a Fluidized Bed Reactors

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Biomass is known as an important renewable alternative energy resource. Sawdust and rice husk were chosen as resources of biomass, which are suitable for domestic power plants. The pyrolysis kinetics of volatile matter was attained under N₂ atmosphere in a thermogravimetric analyzer (TGA). From the TGA and DTG studies of pyrolysis of biomass, the activation energy of sawdust and rice husk were obtained to be 85.0 and 87.7 kJ mol⁻¹, respectively. The steam gasification characteristics of biomass char were determined in a thermo-balance reactor. The shrinking core model shows the best agreement with the experimental data, compared with the volumetric reaction model and the modified volumetric reaction model. The activation energy for gasification of sawdust and rice husk char are found to be 34.3 and 29.0 kJ mol⁻¹, respectively. In addition, the effect of mixing of the biomass (sawdust, rice husk) on gasification characteristics were determined in a fluidized bed reactor. The composition of the product gases was determined from the gas chromatography (GC) analysis.